The Bidirectional Relationship Between Gratitude and Social Well-Being: Evidence from Longitudinal and Diary Methods

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Abstract

Gratitude is an important positive emotion that holds significant implications for human social life. Previous research has indicated an association between gratitude and social well-being, but causal evidence is lacking. To this end, the present study employed longitudinal and diary methods to investigate the causal mechanisms underlying the relationship between gratitude and social well-being. Study 1 conducted a two-wave longitudinal survey with a seven-month interval among 482 participants to examine the bidirectional predictive relationship between trait gratitude and social well-being. Cross-lagged analysis revealed that Time 1 trait gratitude predicted Time 2 social well-being, and Time 1 social well-being also predicted Time 2 trait gratitude. To minimize recall bias, Study 2 implemented a 21-day daily diary study with 248 participants. The results demonstrated that prior-day state gratitude predicted next-day social well-being, and prior-day social well-being also predicted next-day state gratitude. This study elucidates the causal mechanisms between gratitude and social well-being and proposes an upward spiral bidirectional influence model of gratitude and social well-being, which holds practical implications for cultivating gratitude and enhancing social well-being in individuals.

Full Text

The Bidirectional Relationship Between Gratitude and Social Well-Being: Evidence from Longitudinal and Daily Diary Methods

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Abstract

Gratitude is an important positive emotion that plays a significant role in human social life. Previous research has demonstrated an association between gratitude and social well-being, but causal evidence remains lacking. To address this gap, the present study employed longitudinal and daily diary methods to investigate the causal mechanisms linking gratitude and social well-being. Study 1 utilized a two-wave longitudinal design with a seven-month interval among 482 participants to examine the reciprocal predictive relationship between trait gratitude and social well-being. Cross-lagged analysis revealed that initial trait gratitude predicted later social well-being, and initial social well-being also predicted later trait gratitude. To minimize recall bias, Study 2 employed a 21-day daily diary method with 248 participants. The results showed that state gratitude on a given day predicted social well-being the following day, and social well-being on a given day also predicted state gratitude the next day. This research reveals the causal mechanisms between gratitude and social well-being and proposes a spiral upward bidirectional influence model, which has practical implications for cultivating gratitude and enhancing social well-being.

Keywords: gratitude, social well-being, longitudinal method, daily diary method
Classification Number: B848

Gratitude is a time-honored spiritual heritage and a virtue esteemed worldwide, even acclaimed as the "mother of virtues" in Western culture (McCullough et al., 2001). However, gratitude did not initially receive substantial attention in psychology until the flourishing of positive psychology brought this construct into researchers' spotlight. McCullough et al. (2002) conceptualized gratitude as a positive emotion arising when individuals receive a benefit and feel motivated to reciprocate, distinguishing between trait gratitude and state gratitude. Trait gratitude refers to a stable disposition to experience gratitude consistently across situations, whereas state gratitude is situation-specific, representing immediate gratitude experiences (McCullough et al., 2002; Wood et al., 2010). Extensive research has demonstrated that gratitude serves broad adaptive functions: it helps reduce stress (Kreitzer et al., 2019), decrease negative emotions (Ducasse et al., 2019; Mason, 2019; Sherman et al., 2020), alleviate depression (Cregg & Cheavens, 2021; Liang et al., 2020), enhance coping abilities (Tong & Oh, 2021), and improve well-being (Chopik et al., 2019; Emmons & McCullough, 2004; Portocarrero et al., 2020; Yang et al., 2021). Additionally, as a prosocial emotion, gratitude strengthens social connections (Emmons & McCullough, 2004; Emmons & Shelton, 2002) and promotes prosocial behavior (Bono et al., 2019; Yu et al., 2020).

In recent years, the relationship between gratitude and well-being has attracted increasing attention. Cross-sectional studies have found significant positive correlations between gratitude and both subjective well-being and psychological well-being (Ding & Zhao, 2018; Lin & Yeh, 2014; Mason, 2019; Sood, 2012).

Longitudinal research further indicates that gratitude positively predicts subjective and psychological well-being, though the reverse relationship does not hold (Jans-Beken et al., 2018; Nezlek et al., 2019). However, these studies have primarily focused on subjective and psychological well-being, which emphasize individual emotional experiences and psychological functioning—reflecting personal characteristics of well-being and thus termed personal well-being (Miao et al., 2008). In contrast, researchers have proposed the concept of social well-being, which refers to individuals' evaluations of their social circumstances and social functioning, reflecting the significance or value of personal functioning for others or society and whether social functioning is in a good state (Keyes, 1998). Social well-being theory posits that it comprises five dimensions: social integration, social acceptance, social contribution, social actualization, and social coherence (Keyes, 1998). Keyes' s (2007) model of positive mental health further argues that well-being represents a complete state of psychological experience, integrating subjective, psychological, and social well-being—three interrelated yet independent components that reflect individuals' assessments of life quality in three domains: feeling good about life, functioning well personally, and functioning well socially. Moreover, Gallagher et al. (2009) found through confirmatory factor analysis that a three-factor model of subjective, psychological, and social well-being showed significantly better fit than one- or two-factor models, with similar findings reported by Chinese scholars (Chen & Li, 2014). In summary, subjective, psychological, and social well-being represent three dimensions of well-being with both connections and independence. However, few studies have examined the relationship between gratitude and social well-being. Therefore, the present study aims to further investigate this relationship based on existing theory and research.

Some researchers have theoretically suggested that gratitude may be an important factor influencing social well-being. First, the broaden-and-build theory of positive emotions explains gratitude' s long-term promoting effect on social well-being. This theory proposes that gratitude, as a positive emotion, can broaden individuals' thought-action repertoires and build enduring personal and social resources, thereby enhancing social well-being (Fredrickson, 2004). Specifically, gratitude enables beneficiaries to reciprocate kindness more creatively (e.g., using expressive language, caring for those in need), which builds more durable social resources such as intimate friendships and positive social relationships, ultimately improving social well-being. Second, gratitude amplification theory reveals gratitude's short-term predictive effect on social well-being, positing that gratitude amplifies positive aspects of daily life, particularly in social domains, thereby increasing social well-being (Watkins, 2013). In summary, gratitude may exhibit both long-term and short-term effects on social well-being. Given that trait gratitude remains relatively stable in the short term while state gratitude is more susceptible to situational factors (McCullough et al., 2002; Wood et al., 2010), we propose that long-term effects primarily manifest at the trait level, whereas short-term effects mainly occur at the state level. Based on these theories, we hypothesize that gratitude has long-term and short-term predictive

effects on social well-being.

Conversely, social well-being may also predict gratitude. The Personality and Social Relationships model (PERSOC; Back et al., 2011) suggests that individuals' behavioral patterns and perceptions in social relationships relate to personality development. Accordingly, because social well-being involves positive perceptions of the external social environment (e.g., "society is getting better," "I understand what is happening around me," "my community sees me as a valuable member"), such positive perceptions promote new socially adaptive behaviors (e.g., social participation, volunteering) (Cicognani et al., 2008; Son & Wilson, 2012; Yu et al., 2021), thereby influencing the development of personality traits such as gratitude. Therefore, social well-being may have long-term predictive effects on gratitude. Additionally, self-determination theory posits that a meaningful life is an important pathway to positive emotions (De-Haan & Ryan, 2014). Huta and Waterman (2014) note that social well-being constitutes an essential component of a meaningful life because it reflects good social functioning. Thus, when individuals experience higher social well-being, they are more likely to perceive their daily lives as meaningful and consequently experience more positive emotions. Gratitude, as an important positive emotion (Emmons & McCullough, 2004), can also be enhanced through this process. Furthermore, self-determination theory states that optimal functioning depends on satisfaction of three basic needs: autonomy, competence, and relatedness. The satisfaction of relatedness needs reflects well-developed social functioning. When individuals experience higher social well-being, their social functions develop well and relatedness needs are fully satisfied (Keyes, 1998), enabling them to perceive more kindness and experience more gratitude during social interactions. A diary study also confirmed that satisfaction of relatedness needs longitudinally predicts gratitude (Lee et al., 2015). Therefore, social well-being may also exhibit short-term predictive effects on gratitude. Based on this analysis, we hypothesize that social well-being has long-term and short-term predictive effects on gratitude.

Although researchers have begun to examine the relationship between gratitude and social well-being, several important issues remain unresolved. First, previous studies have mostly explored this relationship using cross-sectional data (Caputo, 2015; Palhares et al., 2018; Portocarrero et al., 2020; Wang et al., 2015), which cannot reveal causal predictive relationships. To address this limitation, Study 1 employs a longitudinal method to examine the causal predictive relationship between these variables. Since follow-ups exceeding six months are considered long-term (Eid & Larsen, 2008), Study 1 uses a two-wave design with a seven-month interval to investigate the long-term causal relationship between trait gratitude and social well-being. Second, existing research on social well-being relies primarily on retrospective evaluations of life circumstances, which are susceptible to recall bias. The daily diary method can reduce recall bias and enhance ecological validity, representing one of the gold standards for measuring well-being (Gunthert & Wenze, 2012). Therefore, Study 2 further employs a diary method to examine the short-term causal relationship between state

gratitude and social well-being. In summary, the present research combines longitudinal (Study 1) and daily diary (Study 2) methods to investigate the causal predictive relationship between gratitude and social well-being in adult populations. Based on broaden-and-build theory and gratitude amplification theory, we propose Hypotheses H1 and H2; based on the PERSOC model and self-determination theory, we propose Hypotheses H3 and H4. The specific hypotheses are as follows:

Hypothesis H1: Initial trait gratitude positively predicts later social well-being.
Hypothesis H2: State gratitude on one day positively predicts social well-being the following day.
Hypothesis H3: Initial social well-being positively predicts later trait gratitude.
Hypothesis H4: Social well-being on one day positively predicts state gratitude the following day.

Study 1 employed a two-wave longitudinal design to examine the long-term causal relationship between trait gratitude and social well-being.

2.1 Participants

We recruited 563 participants from a university for a two-wave longitudinal survey with a seven-month interval. At the first time point (T1), we collected 563 samples. Seven months later, we readministered the survey to T1 participants, obtaining 504 samples. After excluding 22 participants who dropped out, missed items, or provided duplicate responses, the final valid sample consisted of 482 participants, yielding an effective response rate of 85.6%. We used G*Power 3.1 software (Faul et al., 2007) to estimate the required sample size. With $\alpha = 0.05$, an effect size of r = 0.20, and power of 80%, a minimum of 193 participants was needed, so our sample size was adequate. Participants had a mean age of 20.30 years (SD = 1.40), including 228 males and 254 females. Participants could withdraw from the study at any time. The study was approved by the local ethics committee.

2.2.1 Gratitude Questionnaire

We used the Gratitude Questionnaire-Six Item Form (GQ-6; McCullough et al., 2002) to assess participants' trait gratitude levels. The scale consists of six items (e.g., "I have so much in life to be thankful for") rated on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate higher gratitude levels. The GQ-6 has demonstrated good reliability and validity in Chinese samples (Kong et al., 2017, 2020; Yang et al., 2021). In the present study, Cronbach' s α coefficients were 0.85 and 0.88 at the two time points, respectively.

2.2.2 Social Well-Being Scale

We used the social well-being subscale from the Mental Health Continuum-Short Form (MHC-SF; Keyes, 2008) to measure social well-being. The subscale includes five items assessing social integration, social acceptance, social contribution, social actualization, and social coherence. Items are rated on a 7-point scale from "strongly disagree" to "strongly agree" (1–7). Higher scores indicate higher social well-being. The MHC-SF has demonstrated good reliability and validity in Chinese samples (Yin & He, 2012). In the present study, Cronbach's α coefficients were 0.85 and 0.93 at the two time points, respectively.

2.3 Data Analysis

Study 1 analyzed data using SPSS 25.0 and Mplus 8.0. First, SPSS 25.0 was used for descriptive statistics, correlation analysis, and common method bias tests (see Table 1). Based on correlation results, Mplus 8.0 conducted cross-lagged analyses, establishing four structural equation models to examine the relationship between trait gratitude and social well-being (see Figure 1 [Figure 1: see original paper]).

Model 1 was the baseline model (M1), an autoregressive model examining temporal stability of the main variables. Model 2 was the forward causation model (M2), which added a cross-lagged path from T1 gratitude to T2 social well-being to M1 to test whether T1 gratitude predicted T2 social well-being. Model 3 was the reverse causation model (M3), which added a cross-lagged path from T1 social well-being to T2 gratitude to M1 to test whether T1 social well-being predicted T2 gratitude. Finally, Model 4 was the bidirectional causation model (M4), which included both autoregressive and all cross-lagged paths.

Additionally, following Hu and Bentler' s (1998) recommended criteria, good model fit was indicated by RMSEA < 0.08, SRMR < 0.10, CFI > 0.90, and TLI > 0.90.

Figure 1 Cross-lagged model of gratitude and social well-being

2.4 Common Method Bias Test

Since the study primarily used self-report measures, common method bias might occur. Therefore, we used Harman's single-factor test to assess common method bias (Zhou & Long, 2004). The results showed five factors with eigenvalues greater than 1, with the first factor explaining 38.1% of total variance—below the 40% threshold—indicating no severe common method bias.

2.5 Results

Table 1 presents means, standard deviations, and correlation matrices for the main variables at both time points. Results showed significant positive corre-

lations between gratitude and social well-being at both time points, consistent with expectations.

Table 1 Means, Standard Deviations, and Correlation Matrix of Gratitude and Social Well-Being (N = 482)

1. T1 Gratitude
2. T1 Social Well-Being 0.31**
3. T2 Gratitude 0.43** 0.26**
4. T2 Social Well-Being 0.29** 0.38** 0.55**

*Note: T1 and T2 represent the two measurement time points; ** $p < 0.01$.*

Next, we examined autoregressive and cross-lagged models of gratitude and social well-being. The autoregressive model M1 showed good fit (see Table 2). In this model, stability coefficients for both gratitude and social well-being were significant, indicating relatively stable variables over time (see Table 3).

The forward causation model M2 also demonstrated good fit. Compared with M1, M2 showed better fit: $\Delta\,^2(1, 482) = 20.44$, $p < 0.001$. The path coefficient from T1 gratitude to T2 social well-being was significant ($\beta = 0.22$, $p < 0.001$), indicating that trait gratitude positively predicted social well-being.

The reverse causation model M3 also showed good fit. Compared with M1, M3 demonstrated better fit: $\Delta\,^2(1, 482) = 15.01$, $p < 0.001$. T1 social well-being predicted T2 gratitude ($\beta = 0.19$, $p < 0.001$), indicating that social well-being could predict trait gratitude.

The bidirectional causation model M4 also exhibited good fit. Moreover, compared with M1, M4 showed better fit: $\Delta\,^2(2, 482) = 29.61$, $p < 0.001$. Compared with M3, M4 also demonstrated better fit: $\Delta\,^2(1, 482) = 14.60$, $p < 0.001$. T1 gratitude positively predicted T2 social well-being ($\beta = 0.19$, $p < 0.001$), and T1 social well-being positively predicted T2 gratitude ($\beta = 0.15$, $p = 0.002$).

Furthermore, after controlling for age and gender, the bidirectional predictive relationship between gratitude and social well-being remained significant (T1 gratitude $\rightarrow$ T2 social well-being: $\beta = 0.18$, $p < 0.001$; T1 social well-being $\rightarrow$ T2 gratitude: $\beta = 0.15$, $p = 0.001$), indicating that results were not influenced by age or gender.

In summary, Study 1 results showed that T1 gratitude positively predicted T2 social well-being, and T1 social well-being positively predicted T2 gratitude. Thus, trait gratitude and social well-being exhibit a long-term reciprocal predictive relationship.

Table 2 Model Fit Indices

Model	χ^2	df	χ^2/df	RMSEA	SRMR	CFI	TLI	Model Comparison	$\Delta\chi^2$	Δdf	p
M1											
M2								M1–M2		1	< .001
M3								M1–M3		1	< .001
M4								M1–M4		2	< .001

Note: RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CFI = comparative fit index; TLI = Tucker-Lewis index.

Table 3 Standardized Stability and Cross-Lagged Coefficients

Path	β	95% CI
Autoregressive Paths		
Gratitude T1 → Gratitude T2	0.38***	[0.30, 0.46]
Social Well-Being T1 → Social Well-Being T2	0.34***	[0.26, 0.42]
Cross-Lagged Paths (M2)		
Gratitude T1 → Social Well-Being T2	0.22***	[0.13, 0.31]
Cross-Lagged Paths (M3)		
Social Well-Being T1 → Gratitude T2	0.19***	[0.10, 0.28]
Cross-Lagged Paths (M4)		
Gratitude T1 → Social Well-Being T2	0.19***	[0.09, 0.28]
Social Well-Being T1 → Gratitude T2	0.15**	[0.05, 0.24]

Note: T1 = Time 1; T2 = Time 2; β = standardized coefficient; ***p < 0.01,*** $p < 0.001$.*

To avoid recall bias, Study 2 employed a daily diary method to further examine the short-term causal relationship between state gratitude and social well-being.

3.1 Participants

Study 2 recruited 274 participants from a university for a 21-day daily diary investigation. The final valid sample comprised 248 participants (38 males) with a mean age of 19.72 ± 1.68 years (range: 17–26). During the 21-day period, seven participants missed one day and two missed two days. Thus, we collected 5,197 data points and imputed 11 missing observations with 999, resulting in 5,208 data points, of which 26 were completed the following morning. We used the R package simr to conduct Monte Carlo simulations to calculate the minimum required sample size (Arend & Schäfer, 2019). Results indicated that with a within-person effect ($\$ 10.std = 0.10, ICC = 0.50), 130 participants (2,730 datapoints) were needed to achieve 85 \$ = 0.05) across 21 days. Therefore, our sample size was adequate. The study was approved by the local ethics committee.

3.2.1 Daily Gratitude

To reduce participant burden in the diary study, we selected the two highest-loading items from the gratitude scale used in Study 1 and adapted them for daily measurement (Garg et al., 2021; Gouveia et al., 2021). We adapted the original items "I have so much in life to be thankful for" and "I am grateful to a wide variety of people" to "Today I had so much to be thankful for" and "Today I was grateful to a wide variety of people." In the present study, the within-person and between-person omega coefficients were 0.80 and 0.87, respectively.

3.2.2 Daily Social Well-Being

We adapted the social well-being scale from Study 1 for diary assessment. In this study, the within-person and between-person omega coefficients were 0.74 and 0.92, respectively.

Additionally, because traditional factor analysis violates assumptions of randomness and independence, we conducted multilevel confirmatory factor analysis on daily gratitude and daily social well-being. In this model, both within-level and between-level included two latent variables (gratitude and social well-being). Results indicated good model fit: $^2 = 616.88$, df = 26, ^{2}/df = 23.73, CFI = 0.94, TLI = 0.91, RMSEA = 0.07, SRMR(within) = 0.04, SRMR(between) = 0.09. Thus, daily gratitude and daily social well-being demonstrated good structural validity.

3.3 Procedure

The study was administered through an online platform. Before the formal study, participants completed demographic information (e.g., gender, age). During the 21-day diary period, daily questionnaire links were sent at 6:00 PM each evening, asking participants to rate their gratitude and social well-being for that day, with links closing at midnight. The following morning at 9:00 AM, links

were resent to participants who had not completed the survey, asking them to report on the previous day, with a noon deadline.

3.4 Data Analysis

Data were analyzed using SPSS 25.0 and Mplus 8.0. Data from participants who withdrew were excluded. Eleven missing observations were coded as 999, and missing values were handled using Full Information Maximum Likelihood estimation. Since daily observations (N = 5,208) were nested within participants (N = 248), the data contained two levels: within-person (Level 1) and between-person (Level 2).

First, we established a null model without predictors to estimate means, within-person and between-person variances, within-person and between-person correlations, and intraclass correlation coefficients (ICC).

Next, to examine the relationship between gratitude and social well-being, we used Dynamic Structural Equation Modeling to construct multilevel regression models with gratitude as the predictor and social well-being as the outcome. The model included both within-level (Level 1) and between-level (Level 2) components. Gratitude, social well-being, and time were estimated with random intercepts and random slopes. Consistent with previous research (Newman et al., 2020), time was included as a control variable at Level 1 to account for linear trends. Time was coded sequentially by survey day (Day 1 = "1," Day 2 = "2," etc.). Gratitude, social well-being, and time were group-mean centered.

The specific model equations are as follows. For Level 1 (within-person), social well-being for person i on day j (yij) can be expressed as:

Within-level: yij (Social Well-Being) = $ $0i + $ $1i(Xij –X) + $ $2i(Tij –T) + rij

Where $ $0i is the intercept representing person i' s average social well-being, $ $1i and $ $2i are slopes representing the rate at which gratitude and time predict social well-being for person i, Xij and X represent person i' s gratitude level on day j and their mean gratitude level, Tij and T represent measurement time and mean measurement time, and rij is the error term representing the portion of y that cannot be explained by predictors for person i at observation j.

For Level 2 (between-person), the model is expressed as:

Between-level:
$ $0i = $ $00 + u0i
$ $1i = $ $01 + u1i
$ $2i = $ $02 + u2i

Where $ $0i represents the random intercept from Level 1, $ $1i and $ $2i represent random slopes from Level 1, $ $00, $ $01, and $ $02 represent corresponding intercepts, and u0i, u1i, and u2i represent residuals for each equation.

To investigate causal predictive relationships between daily gratitude and daily social well-being, we constructed multilevel cross-lagged path models. As shown in Figure 2 [Figure 2: see original paper], $ $1j and $ $4j represent autoregressive effects, while $ $2j and $ $3j represent cross-lagged effects. _{gratitude} and _{social} well-being are intercepts for gratitude and social well-being, respectively. In this model, both variables have random intercepts and random slopes. For simplicity, within-level equations are not presented. The specific model equations are:

γij (Gratitude_{nextday}) = $ $0j + $ $1i(Gratitude_{previousday}) + $ $2i(SocialWellBeing_{previousday}) + rij
γij (SocialWellBeing_{nextday}) = $ $0j + $ $3i(Gratitude_{previousday}) + $ $4i(SocialWellBeing_{previousday}) + rij

Where $ $1j(Gratitude_{previousday}) is the slope of previous-day gratitude predicting next-day gratitude for person i, $ $2j(SocialWellBeing_{previousday}) is the slope of previous-day social well-being predicting next-day gratitude, $ $3j(Gratitude_{previousday}) is the slope of previous-day gratitude predicting next-day social well-being, and $ $4j(SocialWellBeing_{previousday}) is the slope of previous-day social well-being predicting next-day social well-being.

Figure 2 Two-level regression model of daily gratitude and daily social well-being

Finally, to test result stability, we conducted exploratory cross-level moderation analyses to examine whether age and gender moderated the cross-lagged effects. In this analysis, males were coded as "1" and females as "0." Gratitude and social well-being were within-person variables, while gender and age were between-person variables. Within-person variables were group-mean centered, and between-person variables were grand-mean centered.

3.5.1 Descriptive Statistics

Table 4 displays means, within-person and between-person variances, ICCs, and within-person and between-person correlations for gratitude and social well-being. Results showed ICCs of 0.58 for gratitude and 0.67 for social well-being, indicating that 42% of variance in gratitude and 33% of variance in social well-being were attributable to within-person differences. Thus, multilevel analysis was appropriate (Zhang et al., 2003). Within-person correlation analysis revealed a significant relationship between gratitude and social well-being (r = 0.36), indicating that higher daily gratitude was associated with higher daily social well-being.

Table 4 Descriptive Statistics and Intraclass Correlation Coefficients (ICC)

Variable	Mean	Within-Person Variance	Between-Person Variance	ICC
Gratitude	5.54	1.21	1.68	0.58
Social Well-Being	4.69	0.69	1.40	0.67

Note: Within-person and between-person correlations for gratitude and social well-being: lower left = within-person correlations, upper right = between-person correlations; ** $p < 0.001$.*

3.5.2 Multilevel Regression Analysis

To further examine the relationship between gratitude and social well-being, we constructed a multilevel regression model with gratitude predicting social well-being. The model indicated that gratitude predicted individuals' social well-being ($\gamma = 0.59$, SE = 0.04, t = 13.94, $p < 0.001$). This effect remained significant after controlling for time ($\gamma = 0.58$, SE = 0.04, t = 13.85, $p < 0.001$).

3.5.3 Multilevel Lagged Effects Analysis

Multilevel cross-lagged path analysis showed that state gratitude on a given day predicted state gratitude the next day ($\gamma = 0.19$, SE = 0.02, t = 9.58, $p < 0.001$), and social well-being on a given day predicted social well-being the next day ($\gamma = 0.16$, SE = 0.02, t = 8.15, $p < 0.001$). These results indicate high within-person stability for both gratitude and social well-being over the 21-day period—once individuals exhibited higher levels, they tended to persist. Additionally, state gratitude on a given day predicted social well-being the next day ($\gamma = 0.09$, SE = 0.03, t = 2.90, $p = 0.004$), and social well-being on a given day predicted state gratitude the next day ($\gamma = 0.03$, SE = 0.01, t = 2.84, $p = 0.005$). Thus, gratitude and social well-being showed reciprocal predictive effects (see Table 5).

Table 5 Relationships Between Gratitude and Social Well-Being

Effect	Fixed Effect γ (SE)	Random Effect τ (SE)
Mean		
Gratitude	5.54(0.12) ***	3.28(0.28) ***
Social Well-Being	4.69(0.24) ***	14.30(1.22) ***
Autoregressive Effects		

Effect	Fixed Effect γ (SE)	Random Effect τ (SE)
Gratitude T1→Gratitude T2	0.19(0.02) ***	0.03(0.01) ***
Social Well-Being T1→Social Well-Being T2	0.16(0.02) ***	0.03(0.01) ***
Cross-Lagged Effects		
Gratitude T1→Social Well-Being T2	0.09(0.03) **	0.02(0.02)
Social Well-Being T1→Gratitude T2	0.03(0.01) **	0.01(0.00) ***

Note: T1 = previous day; T2 = next day; SE = standard error; ***p < 0.01,*** p < 0.001.*

3.5.4 Cross-Level Moderation Analysis

Exploratory cross-level moderation analyses revealed that neither age nor gender significantly moderated the cross-lagged paths between gratitude and social well-being (ps > 0.05).

3.5.5 Supplementary Analysis

Considering potential differences between morning and evening psychological states, we reanalyzed the data after excluding participants who responded the following day. Multilevel regression showed that state gratitude predicted social well-being ($\gamma = 0.57$, SE = 0.04, t = 13.26, $p < 0.001$), and this effect remained significant after controlling for time ($\gamma = 0.55$, SE = 0.04, t = 13.10, $p < 0.001$). Multilevel cross-lagged analysis showed that state gratitude on a given day predicted social well-being the next day ($\gamma = 0.09$, SE = 0.03, t = 2.94, $p = 0.003$), and social well-being on a given day predicted state gratitude the next day ($\gamma = 0.03$, SE = 0.01, t = 2.40, $p = 0.002$). Thus, time of day did not significantly affect results.

In summary, Study 2 demonstrated a short-term bidirectional predictive relationship between state gratitude and social well-being.

The present research employed longitudinal and daily diary methods to investigate the causal relationship between gratitude and social well-being. Study 1 found that initial trait gratitude significantly predicted later social well-being, and initial social well-being significantly predicted later trait gratitude. Study 2 revealed that state gratitude on a given day significantly predicted social well-being the next day, and social well-being on a given day significantly predicted state gratitude the next day. Moreover, these results were not affected by demographic factors such as age and gender.

Overall, this study systematically verified the bidirectional predictive relationship between gratitude and social well-being using both long-term and short-term tracking methods.

4.1 Gratitude' s Predictive Effect on Social Well-Being

Study 1 found that initial trait gratitude positively predicted later social well-being, supporting Hypothesis H1 and demonstrating that trait gratitude has a long-term promoting effect on social well-being. This finding aligns with previous research (Froh et al., 2010) and supports the broaden-and-build theory (Fredrickson, 2004), which posits that gratitude broadens individuals' behavioral and cognitive patterns and improves their interaction with the external environment. Algoe et al. (2016) also confirmed that grateful individuals hold more optimistic and positive attitudes toward interpersonal relationships and are more willing to employ relationship maintenance strategies, which helps them build enduring social support systems and enhance social well-being. Wang et al. (2022) similarly found through longitudinal research that gratitude predicted social support six months later. Lambert and Fincham (2011) showed that expressing gratitude to partners enhanced partners' positive evaluations of the relationship and comfort when expressing relationship concerns, contributing to long-term relationship maintenance. In summary, gratitude motivates individuals to build supportive social relationships and construct enduring social resources, thereby improving their social well-being.

Study 2 found that state gratitude on a given day positively predicted social well-being the next day, indicating that state gratitude has a short-term promoting effect on social well-being. This result supported Hypothesis H2 and is consistent with previous findings (Khanna & Singh, 2021). Our study further provides novel evidence for state gratitude's predictive effect on social well-being at the daily level. As gratitude amplification theory suggests, state gratitude can activate individuals' prosocial motivation and prompt positive social behaviors (Watkins, 2013). Such positive social interactions enhance perceived social connections, thereby increasing social well-being.

Additionally, Yang et al. (2021) used a two-wave longitudinal design to find that gratitude predicted personal well-being, and Zhang et al. (2022) obtained similar results using a diary method. Therefore, gratitude promotes both personal and social well-being. Gratitude encourages individuals to view their personal

and social lives more positively and optimistically and to engage in positive behaviors, thereby enhancing daily personal and social well-being. It also helps individuals build enduring personal and social resources, thereby improving long-term personal and social well-being.

4.2 Social Well-Being' s Predictive Effect on Gratitude

Study 1 also found that social well-being positively predicted trait gratitude seven months later, supporting Hypothesis H3 and demonstrating that social well-being has a long-term predictive effect on gratitude. This finding extends previous research showing that social well-being significantly predicted positive and negative affect 20 years later (Joshanloo, 2018) to the specific emotional dimension of gratitude. Based on the PERSOC model, personality development is influenced by individuals' cognitions and interaction patterns in social relationships (Back et al., 2011). Individuals with high social well-being hold more positive perceptions of their social relationships, willingly engage in social activities and community organizations, and exhibit more prosocial behaviors. These positive social interaction patterns foster the development of relatively stable gratitude tendencies.

Study 2 further revealed that social well-being can also influence state gratitude in the short term, supporting Hypothesis H4. Currently, no research has examined the short-term longitudinal relationship between social well-being and gratitude, so our study provides preliminary evidence in this area. Based on self-determination theory (DeHaan & Ryan, 2014), individuals with high social well-being exhibit good social functioning, actively interact and connect with others in daily life, have their relatedness needs satisfied, and consequently experience more gratitude. Moreover, social well-being enhances individuals' sense of value and meaning in life, which further elicits more positive emotions like gratitude. In summary, social well-being enables individuals to perceive greater meaning and value in their interactions with others, and positive social interactions satisfy their daily relatedness needs, leading to more gratitude experiences. Additionally, individuals with high social well-being are more willing to participate in social activities and exhibit prosocial behaviors, which also increase gratitude tendencies. However, this pattern does not appear to hold for personal well-being; previous researchers using longitudinal and diary methods to examine personal well-being' s predictive effect on gratitude at both trait and state levels found no effects, likely because the components of these two types of well-being differ, suggesting the relative independence of social and personal well-being.

4.3 A Spiral Upward Bidirectional Influence Model of Gratitude and Social Well-Being

Integrating findings from Studies 1 and 2, gratitude and social well-being exhibit a bidirectional predictive relationship. To explain these results, we pro-

pose a spiral upward bidirectional influence model based on relevant theories. Specifically, gratitude amplifies individuals' attention to positive aspects of life, particularly in social domains. For example, gratitude amplifies benefits provided by benefactors, making recipients more likely to perceive these benefits as favors rather than obligations, leading to more positive evaluations of current social life and thereby enhancing social well-being in the short term. Additionally, as a positive emotion, gratitude broadens individuals' thought-action repertoires, enabling them to reciprocate others in more diverse ways after receiving help. Such positive interactions help individuals build long-term social resources, such as constructing positive social relationships and acquiring good social skills, thereby improving long-term social well-being. Conversely, higher levels of social well-being help individuals experience stronger social belonging and identity, as well as greater social value. These well-developed social functions satisfy individuals' daily relatedness needs, make life more meaningful, and thus elicit more gratitude. Simultaneously, enhanced social well-being fosters positive perceptions of the external social environment and one' s own social functioning, which motivates new socially adaptive behaviors (e.g., volunteering, providing support to others), contributing to long-term changes in gratitude levels. These processes collectively constitute a spiral upward bidirectional influence model in which gratitude and social well-being mutually promote each other in a continuous cycle.

Although we found reciprocal predictive effects between gratitude and social well-being, this pattern does not hold for the relationship between gratitude and personal well-being. For instance, Yang et al. (2021) used a two-wave longitudinal design to confirm trait gratitude' s predictive effect on personal well-being but found no reverse effect. Zhang et al. (2022) used a diary method to find that state gratitude predicted personal well-being, but personal well-being did not predict state gratitude. Therefore, our proposed spiral upward model does not apply to personal well-being. This may be because both gratitude and social well-being are socially oriented constructs whose development depends on and influences each other. Social well-being involves perceptions of interpersonal relationships, while gratitude is a quintessential relational emotion (Algoe et al., 2008) that arises from social relationships. In contrast, subjective and psychological well-being emphasize individual emotional experiences and psychological functioning, which are not directly tied to social relationships and thus may not predict gratitude. Our findings reveal functional differences and relative independence between social and personal well-being, suggesting that enhancing gratitude should focus on social rather than personal well-being.

4.4 Limitations, Significance, and Implications

This study has several limitations. First, despite using reliable and valid measures, self-report bias may still exist. Future research could employ alternative methods, such as other-report measures, to more objectively examine the gratitude-social well-being relationship. Second, most participants in Study 2

were female, so future studies should examine whether these conclusions generalize to male populations. Third, cross-cultural research suggests that Eastern cultures emphasize relational gratitude more than Western cultures (Mendonça et al., 2018; Wang et al., 2015), which may better facilitate social well-being. Therefore, future research should examine whether current findings generalize to other cultural groups. Fourth, although longitudinal designs can reveal potential causal relationships, causal claims should be made cautiously. Future research could employ experimental methods to further clarify causal relationships between gratitude and social well-being.

Despite these limitations, this study has notable strengths. To our knowledge, few studies have examined the longitudinal relationship between gratitude and social well-being. Our research explores their causal predictive relationship from a longitudinal perspective, providing new evidence in this area. First, since well-being research has focused primarily on personal well-being while neglecting its social dimension, our study enriches the literature on gratitude and well-being. Additionally, by investigating the causal relationship between gratitude and social well-being, we not only discovered bidirectional predictive effects but also proposed, for the first time, a spiral upward bidirectional influence model. Beyond theoretical contributions, our findings have important practical implications. On one hand, interventions could target gratitude education and cultivation to enhance individuals' social well-being. On the other hand, programs designed to improve social well-being could further elevate gratitude levels.

In conclusion, this study combined longitudinal and daily diary methods to examine the causal relationship between gratitude and social well-being from a longitudinal perspective. Results showed that trait gratitude predicted social well-being and vice versa, and that state gratitude predicted social well-being and vice versa. Therefore, gratitude and social well-being exhibit a bidirectional predictive relationship.

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The relationship between gratitude and social well-being: Evidence from a longitudinal study and a daily diary investigation

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Abstract

The positive psychological construct of gratitude is crucial for health and well-being. Previous studies have shown a significant positive correlation between gratitude and social well-being. However, no studies have examined this potentially reciprocal relationship from a longitudinal perspective. According to the broaden-and-build theory and gratitude amplification theory, we hypothesized that gratitude has a direct effect on social well-being. In addition, based on the personality and social relationships model and self-determination theory, we proposed that social well-being is an antecedent to gratitude. In summary, this research combines a longitudinal study and a daily diary investigation to systematically explore the causal mechanism between gratitude and social well-being.

Study 1 employs a two-wave cross-lagged design to explore the long-term relationship between trait gratitude and social well-being. The sample comprised 563 undergraduate students, who all participated online. Pursuant to the study purpose, participants were asked to complete the gratitude and social well-being scales twice, separated by a seven-month interval. The cross-lagged path analysis suggested reciprocal effects between trait gratitude and social well-being. To reduce recall bias and explore the short-term association between gratitude and social well-being, Study 2 employs a daily diary method. A total of 274 young adults completed daily gratitude and social well-being measures for 21 consecutive days.

In Study 1, trait gratitude at T1 significantly positively predicted social well-being at T2, while social well-being at T1 also significantly predicted trait gratitude at T2. These effects remained significant after controlling for age and gender. Consistent with Study 1, Study 2 also revealed a reciprocal relationship: state gratitude on one day positively predicted social well-being the next day, while social well-being on one day also positively predicted state gratitude the next day. Moreover, these relationships were stable after controlling for time trend. Overall, the results of Study 1 and Study 2 support the hypotheses by showing reciprocal predictive effects between gratitude and social well-being.

In summary, we predicted that experiencing gratitude would lead to higher

social well-being, which would, in turn, result in higher gratitude, activating an upward spiral. This work deepens understanding of the interaction between gratitude and social well-being, paving the way for future intervention research to help increase both.

Keywords: gratitude; social well-being; longitudinal study; daily diary method

Note: Figure translations are in progress. See original paper for figures.